

**PARTNERSHIPS IN ARTS INTEGRATION RESEARCH  
(PAIR) FINAL COMPREHENSIVE REPORT**

**Part 2: Impact of PAIR on Student Academic  
Performance**

**A Comparative Analysis of Control-Treatment School Student  
Standardized Academic Test Learning Outcomes by All School Types and  
Student Academic Classifications (Years 2007-2010)**

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## **PAIR Final Report PART 2: Student Academic Performance Impact:**

### **The Analysis of Control-Treatment School Student Standardized Academic Test Learning Outcomes by All School Types and Student Academic Classifications (2007-2010)**

#### *Introduction*

This report is the second part of a three-part comprehensive report filed by both Dr. Burnaford and Dr. Scripp, as Co-Principal Investigators of the PAIR project.

The first report, written by Dr. Gail Burnaford [2010], focused primarily on three years of collecting evidence of progress meeting PAIR teacher professional development goals, the evolution of teacher professional development outcomes in comparison with control group teachers, and speculation on the general impact of high quality PAIR teacher practices on student learning.

The second and third parts of this report, written by Dr. Lawrence Scripp and his research team from the Center for Music-in-Education and CAPE (2011-2012), focus on the impact of PAIR on student learning. This second report (2011) reports primarily on differences among control-treatment statistical comparisons of PAIR student academic test outcomes. The following third report (2012) features an extensive review of qualitative and quantitative aspects all PAIR student arts integration outcome data. In addition, it provides a comprehensive analysis of the possible statistical links between seven teacher professional development factors and four student learning outcomes.

#### **2A. Review of the Background, Purpose, and Scope of the PAIR Project**

In this paper we report on a research project in arts integration education, conducted in the Chicago Public Schools in partnership with Chicago Arts Partnerships in Education (CAPE), a research-based organization focused on optimizing the impact of artists and arts learning in schools for the benefit of whole-school improvement in arts learning, teacher professional development, and school culture.

The PAIR project follows a previous AEMDD *Developing Early Literacies Through the Arts* (DELTA) grant that resulted in developing models of teaching artist residencies focused on fundamental concepts and skills in the musical, visual, movement, and dramatic arts as conduits for reinforcing and improving early literacy goals for the Chicago Public Schools (CPS) [Scripp and

Sienkiewicz 2007; CAPE 2008]<sup>1</sup>. As reported in Dr. Burnaford's report, PAIR builds also upon the outcomes of a previous three-year Department of Education Professional Development Grant project titled Building Curriculum, Community, and Leadership through the Arts (BCCLA), in which 59 Fine and Performing Arts Magnet Cluster School arts specialists experienced professional development that supported the development of arts integrated curriculum, leadership, and community.

Building on DELTA professional development, curricular and assessment practices, the specific aim of the Partnerships in Arts Integration Research was to develop models of arts integration for upper elementary schools based on the intersections between arts and non-arts content learning that not only supports the development of arts learning skills and concepts, but also influences academic content learning in students. These models were developed over a three-year period and assessed through the documentation and reflection on the learning experiences of the participating grade level teachers in collaboration with CAPE artists (as reported extensively in Dr. Gail Burnaford's PAIR report), and by developing and employing multiple methods of documenting and assessing student learning (as reported in both PAIR final reports).

The assumption of the PAIR research is that arts integration differs significantly from both conventional arts and academic instruction in school settings, primarily because of its focus on a) the development and modeling collaboration between the CAPE teaching artist and the grade level teachers on the contribution of arts learning processes to academic learning in the classroom, b) the primacy of designing curriculum units based on shared arts and academic content knowledge and skills demonstrated by both the collaborating arts and grade level teachers, and c) the commitment of the classroom teachers to engage in the process of ongoing documentation, reflection, and evaluation of research-based practices as a fundamental strategy for establishing innovative practices necessary to distinguish PAIR schools from the comparison schools.

This view of arts integration also suggests arts learning should be more than just a subject to be taught by specialists alone or taught to children only for its own sake, but as a resource and approach to learning across the curriculum, for the benefit of both teachers and students. In the PAIR project the teacher professional development aspects of the PAIR project were achieved as necessary condition for "arts plus arts integration" teaching and learning that affects the whole school culture. Hence arts

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<sup>1</sup> See capeweb.org for DELTA report.

integration is not conceived only as a strategy for teaching certain facts or concepts in the academics, but as a deep resource for melding powerful learning processes and understanding of content that is shared across arts and academic disciplines and discovered by students, grade level teachers and teaching artists alike.

### *Research Design Structural Elements*

The research design of this project specified that six elementary schools in Chicago – two Mathematics and Science, two World Languages (foreign language ) and two Literature and Writing (English language arts) Magnet Cluster Schools – were to be selected as PAIR treatment schools. A matched set of randomly selected Magnet Cluster Schools served as control schools in this study. Of these six CPS Magnet Cluster schools, three were highly arts and arts integrated learning focused and three were primarily academic (see 2A Table 1 below).

**2A Table 1: PAIR School Profiles**

PAIR Schools	Matched Control (Comparison) Magnet Cluster Schools	Academic/ Arts Primary Learning Approach FOCUS	CPS Magnet CLUSTER School Designation	Additional Resource Faculty Specialists	CAPE PAIR Teaching Artist 10 week Residence/ Curriculum units
Lee	CPS Control School a	Academic	ELA (Writing)	Writing, visual art	Music, drama
Eberhart	CPS Control School b	Arts	ELA	Music, visual art, arts integration	Music, drama
Thorp	CPS Control School c	Academic	MATH	Math, music, visual art	Visual art, dance
Swift	CPS Control School d	Arts	MATH	Music, visual art, arts integration	Visual art, dance
Ward	CPS Control School e	Academic	WL (World Language)	Social & cultural studies, Spanish, visual art	Music, visual art
Healy	CPS Control School f	Arts	WL (World Language)	Social & cultural studies, music, Spanish, visual arts, arts integration	Music, visual art

The aim of the research was to document and analyze the development of a general model of arts integration professional development, curriculum and assessment practices adaptable across various types of CPS Magnet Cluster Schools and their impact on teachers and student learning in comparison with a set of control schools matched according to Magnet Cluster School designation, school performance and demographic considerations.

*PAIR Student Learning and Teacher Professional Development Data Collection Sequence*

**Student Learning Data Collection:** Clearly the success of this project depends on results from both external and internal student learning assessments. Without positive indications of student learning gains compared to district averages and control school comparisons, the PAIR project would not represent a responsible or viable alternative to conventional arts and academic methods of teaching and assessing learning.

Indications of high quality teacher professional development outcomes in comparison with control group teachers described in part 1 of this report make it possible to assume that if any positive student learning outcomes do obtain, it can be reasonably be assumed that the PAIR program may be a critical link to this learning success.

Thus, in order to test the hypothesis that CAPE's arts integration methods brought to the implemented in the PAIR project we will need to see a rigorous evaluation of student academic performance data. Thus the external standard academic test data from the grade level Illinois Standards Academic Tests (ISAT) were collected each year of the project to determine to how students in the PAIR longitudinal cohorts in treatment schools compare with control group cohorts.

As indicated in the chart below the data collection was organized into three cohorts:

- A) The Initial PAIR Longitudinal Cohort randomly selected from pools of pre-designated High (H), Average (A), and Low (L) academic performance rated students in both treatment and control CPS Magnet Cluster schools. These 'HAL' students were also assessed for arts learning through the internally developed Snapshots of Arts Integrated Learning (SAIL) interview protocols, PAIR portfolio conference performance assessment procedures (administered only in treatment schools) and PAIR student work samples (in treatment schools). In addition PAIR student self-report surveys inform us as to classroom culture differences between PAIR and control school classrooms.
- B) The PAIR Follow-up Longitudinal Cohort 1 where data collection is limited to student ISAT test scores from entire treatment school classrooms in comparison with all other non-PAIR classrooms. This follow-up cohort will provide a window into academic performance



differences between PAIR classrooms with teachers who have 2 years of experience with the project.

- C) The PAIR Follow-up Longitudinal Cohort 2 where data collection is limited to student ISAT scores from entire treatment school classrooms in comparison with all other non-PAIR classrooms. This follow-up cohort will provide a window into academic performance differences between PAIR classrooms with teachers who have 3 years of experience with the project.

The table [2A Table 2] below summarizes the data collection design elements from the viewpoint of student learning related assessments

**2A Table 2: PAIR Student Learning & Teacher Professional Development**  
**Data Collection Sequence**

Longitudinal Cohorts	PAIR Planning Year	PAIR Year 1	PAIR Year 2	PAIR Year 3
A. INITIAL HAL Longitudinal Student Cohort  (Control and Treatment HAL samples)	Grade 3 ISAT data collected from HAL student sample	Grade 4 ISAT data from year 1 HAL student C-T samples  Grade 4 Teacher PD Year 1  PD session surveys and attendance figures beginning with Grade 4 teachers	Grade 5 ISAT data collected from Year 2 HAL student C-T samples  SAIL Interview 1 Student Survey 1  Grade 5 Teacher PD Year 1  PD session surveys and attendance figures now include Grade 4 -5 teachers	Grade 6 ISAT data collected from Year 3 HAL student C-T samples  SAIL Interview 2 Student Survey 2  Grades 4-6 (Student Years 1-3) PAIL Portfolio Conference 1  Grade 6 Teacher PD Year 1 Year-End Curriculum and Teacher Survey PD session surveys and attendance figures; PAIL portfolio conference transcribed comments; teacher practice labels of student work; PD session documentation panels & curriculum maps

(2A Table 2 continued on the following page)

*PAIR Final Comprehensive Report Part 2 (A-G): Impact of PAIR on STUDENT Academic Performance  
(Scripp)*

B. FOLLOW-UP PAIR Longitudinal Student Cohort 1  (Control and Treatment Classrooms)			Grade 4 ISAT data collected from Year 1 HAL students C-T samples  Grade 4 Teacher PD year 2  PD session surveys and attendance figures continuing with Grade 4 teachers	Grade 5 ISAT data collected from Year 2 HAL student C-T samples  Grade 5 Teacher PD year 2 Year-End Curriculum and Teacher Survey PD session surveys and attendance figures; PAIL Portfolio conference transcribed comments; teacher practice labels of student work; PD session documentation panels & curriculum maps
C. FOLLOW-UP PAIR Longitudinal Student Cohort 2  (Control and Treatment Classrooms)				Grade 4 ISAT data collected from Year 1 HAL students C-T samples  Grade 4 Teacher PD year 3 Year-End Curriculum and Teacher Survey PD session surveys and attendance figures; PAIL Portfolio conference transcribed comments; teacher practice labels of student work; PD session documentation panels & curriculum maps

*PAIR Teacher Professional Development Data Collection*

The success of this project depended on the quality of the multi-leveled partnership between CAPE staff and six CPS Grade 4-6 schools. The professional development, curriculum design, planning and implementation processes involved intensive collaboration between artists and teachers throughout the three years of the project and the results of this work needed to clearly differentiate the treatment from the control schools in order to establish links between program development and student learning outcome variables.

As described by Dr. Burnaford in Part 1 of this report, A Year-End Curriculum and Teaching Survey was administered to 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> grade teachers in all twelve schools (treatment and control) during Year Three of the project. Other data were also collected from the teachers in the 6 PAIR schools, including professional development session surveys and attendance figures, portfolio conference transcribed comments, student work and teacher practice labels and documentation from work completed at professional development sessions (documentation panels and curriculum maps). These data were analyzed in Dr. Burnaford's PAIR report to establish clear criteria for high quality arts integration teaching practices through survey responses and student teacher conferences. It is highly

significant that Dr. Burnaford also was able to articulate differences between treatment and control group teacher through these same data collection instruments.

In all sections of part 3 of this report, these same teacher professional development data sources are used also to explore the relationship between teacher professional development outcomes and student learning tests and performance assessments.

### *CAPE Teaching Artist Role in PAIR*

All CAPE teaching artists were highly qualified artists, artist-teachers, and veterans of many years of formative participants in CAPE research-based projects. PAIR teachers had access to two CAPE teaching artists each year in two art forms [see Table 1: PAIR School Profiles for distribution of art forms]. These artists participated in PAIR PD sessions, met with classroom teachers to develop PAIR units every year of the project, and collaborated often with the classroom teachers in the implementation of these units. In addition the teaching artists provided continuity and focus across grade levels in ways that proved highly significant to the research design.

Essentially, the teaching artists modeled high-quality arts integration teaching practices while helping teachers to adapt CAPE methods for arts integration into the their classroom practice. This collaborative process rigorously adhered to principles of consensus-building between the teacher and teaching artist during the unit development process thus providing a significant measure of process validity and reliability that provided confidence in the distinctions between the treatment school arts integration practices in comparison with control school classroom practices. In addition, the CAPE teaching artists and PAIR teachers, without exception, remained assiduously faithful to the primary mission and focus of the particular Magnet Cluster School throughout the course of the project that validated PAIR Cluster school comparisons.

As a result of teacher and teaching artist contributions to the student work products and documentation processes, researchers were able to see evidence in the PAIR student learning artifacts of both high quality arts learning and arts integrated learning, often in the same student work products, reflective thinking documentation, and in the SAIL interviews and Portfolio Conference Performance Assessments [see chapters on SAIL and Portfolio Conference analyses in part 3 of this report for more details).

In sum, it appears to the student evaluation team that the CAPE teaching artists provided essential quality control indicators for the project particularly as the Initial Longitudinal Cohort students completed the final year of the project. In every portfolio conference, students were completely aware of detailed experiences with their teaching artist over the three years of the project, and the teachers were amazed at the positive shifts in classroom dynamics and learning culture when teaching artists visited the schools. Maintaining the same teaching artist teams in every school in the initial cohort over three years meant that the longitudinal treatment school students received a distinct and ongoing arts integration intervention in comparison with the control school students.

### *Analytic Framework and Processes*

In the following sections of this report, the analytic framework and processes will remain largely constant, making it relatively easy to organize multivariate analysis and compare statistical results.

The analyses will proceed sequentially from the relatively simple general comparisons to the more specific and complex, mirroring the order of presentation in PAIR School Profiles [2A-Table 1 above]. Results from control-treatment comparisons will identify factors most clearly identified with the development and distinctive quality of the PAIR program in various contexts (school profiles) and looking at various types of student samples following the data collection sequence over time [see 2A Table 2 above].

Starting with the Illinois Standards Achievement Test (ISAT) scores, we will begin by studying averaged academic scores that combine reading and math, and then separate the disciplines. We will be looking for statistically significant differences by control/treatment comparisons, by magnet school focus control-treatment comparisons (Arts vs. Academic Focus), and finally by School Cluster control-treatment comparisons: (Writing [ELA], Math, or World Languages s [WL]).

Next, we will examine intensively the *initial longitudinal sample* of students as they progress through grades 4-6 as classroom teachers are first entering the project in comparison with *follow-up longitudinal student cohorts* to look for impact of classroom teacher experience with the teaching artists and its impact on student learning.

Whenever possible this pattern of analysis will be applied to *student internal assessment and survey data* that were administered to both control and treatment groups such as the Snapshots of Arts

Integration Learning (SAIL) and PAIR student surveys, and to those internal assessments only administered to the treatment school students such as PAIL portfolio conference performance assessments or PAIL student work assessments.

In the final sections of the comprehensive report, we will explore the intersections between *internal measures of teacher professional development outcomes* and *both external and internal measures of student learning*. That is, we will investigate relationships between data collected from teachers (including the Year-End Curriculum and Teacher Survey [YECS], PD session surveys and attendance figures, PAIL Portfolio conference transcribed comments, teacher practice labels of student work; PD session documentation panels & curriculum maps) and all forms student learning assessment data described above.

### *Presentation of Results*

The presentation of results in the following sections of this paper will be in the form of narrative report informed by statistical analysis. Thus each section will be framed by a sequence of inquiry questions, themes, and vignettes designed to illuminate the stories that have emerged from the PAIR project. In the last section the implication of PAIR outcomes will be explored in ways that will help teachers, administrators and parents understand better the essential role and potential impact of research-based arts integration teaching practices and learning outcomes in upper elementary public school education.

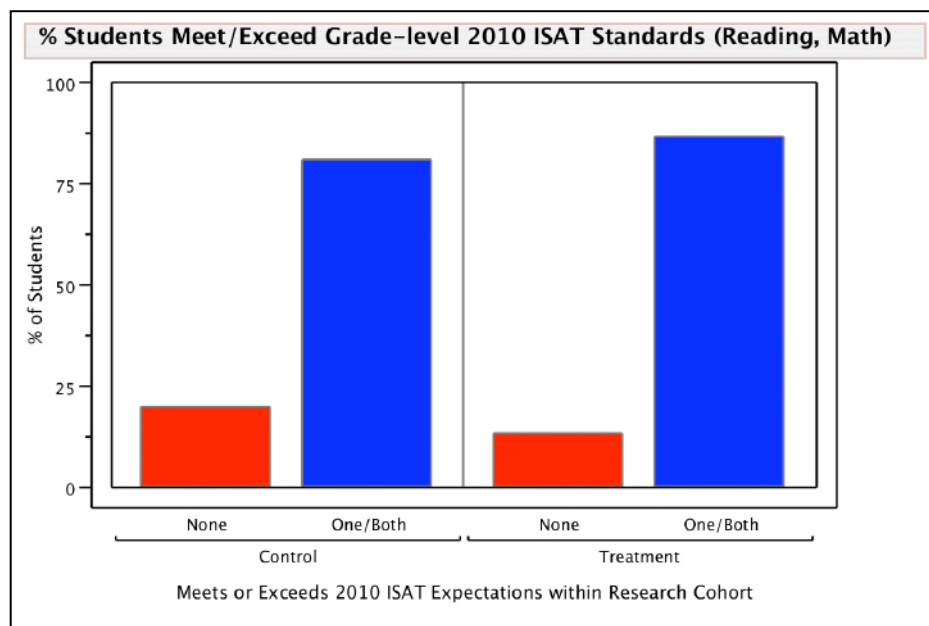
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## **2B. External Student Learning Assessments: *Control-Treatment (C-T) Analysis of Illinois Standards Academic Achievement Test (ISAT) Results***

***Section 2B Inquiry Questions:*** To what extent are there significant differences in the percent of students ‘meeting or exceeding or exceeding grade-level CPS ISAT benchmarks’ among District, PAIR control and PAIR Treatment Schools in Reading and Math? What are differences between the 2010 INITIAL Longitudinal Cohort (Grade 6) and the two FOLLOW-UP Longitudinal Cohorts (Grades 4-5)

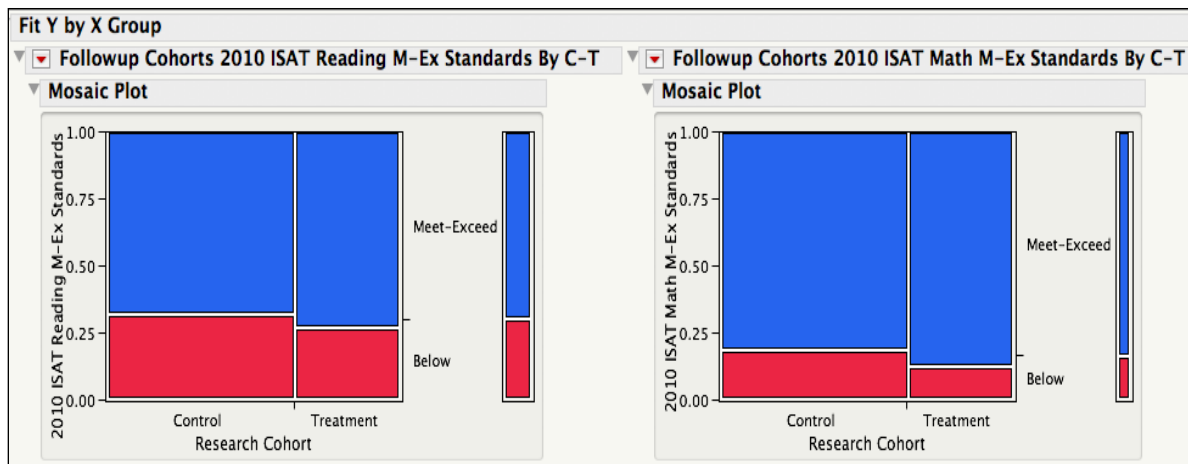
**2B Figure 1 Data Display Indications:** The bar chart below indicate clearly that, by the end of the PAIR Project, *the Treatment School initial longitudinal student cohorts contain a higher percentage (87%) of students who meet or exceed CPS grade-level benchmarks in Averaged Reading and Math ISAT test scores than students in the Control School initial longitudinal cohorts (81%)* [2B Figure 1]. This positive indication of comparatively strong general academic progress in the treatment schools is the bottom line statistic required of all successful AEMDD projects.

**2B Figure 1: Control-Treatment School Comparisons of Percent of PAIR Grade 6 Initial Longitudinal Cohort Students who Meet or Exceed Chicago Public School ISAT Benchmarks in One (Reading or Math), Both (Reading and Math) or None (Neither Read or Math)**



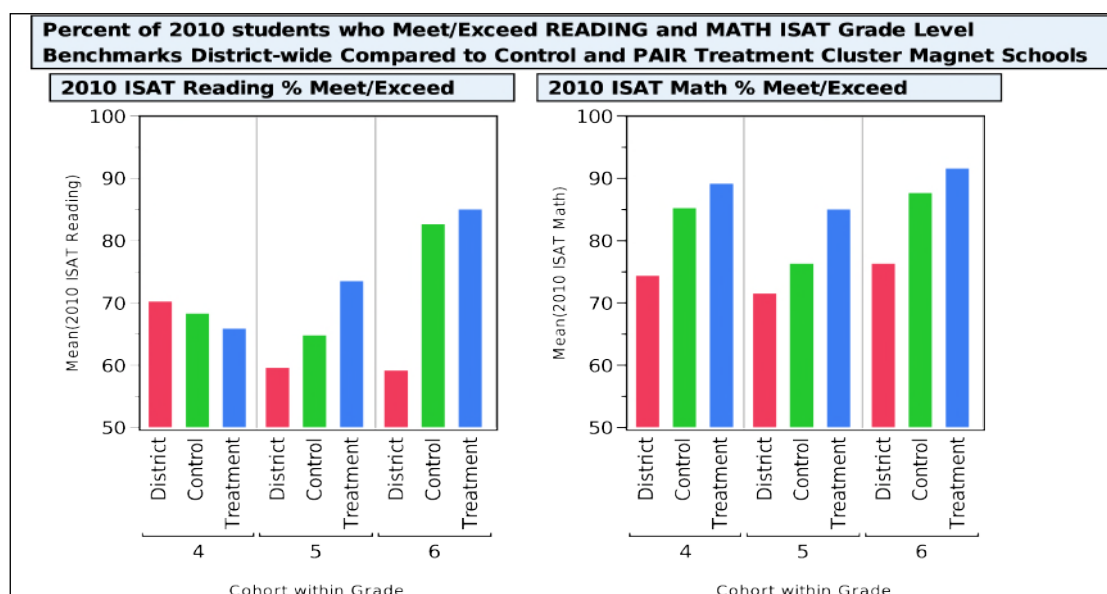
**2B Figure 2 Data Display Indications:** The mosaic chart below [2B Figure 2] expands the comparison to include the Reading and Math benchmark data to include averaged statistics from both of the two PAIR follow-up longitudinal cohorts control-treatment school comparisons. Follow-up Longitudinal Cohort 1 (grades 4-5, 2009-10) and Follow-up Longitudinal Cohort 2 (Grade 4, 2010). Comparison of benchmark data indicate again the positive impact of the PAIR program over time and across three different student samples in both Reading and Math.

**2B Figure 2: Control-Treatment ISAT Grade Level Benchmark Comparisons for Reading and Math in PAIR Follow-up Longitudinal Cohorts**



**2B Figure 3 Data Display Indications:** The bar charts below provide a great deal more detail by distinguishing Reading and Math ISAT scores in relation to three statistics: CPS District average, PAIR Control and PAIR Treatment School cohorts. *With the exception of grade 4 reading percentiles, the initial longitudinal Treatment School cohort students are outperforming the Control School students and averaged district scores at every level in both reading and math.* The significance of these findings are highest in the second year of the sample (Reading  $p < .005$ ; Math grade 5  $p < .001$ ).

**2B Figure 3: Control-Treatment ISAT 2010 Grade Level Benchmark Comparisons for Reading and Math in PAIR INITIAL (Grade 6) and Follow-up (Grade 4 and 5) Longitudinal Cohorts**



The data comparisons above [2B Figure 3] indicate consistent performance differences between the treatment schools and especially between the treatment and the overall CPS district averages. Note that the single counter-indication in control-treatment comparisons that occurred in grade 4 of the first longitudinal group in Reading occurred only at the very first year of the project when the program was least developed. Note also that both the PAIR control and treatment school cohorts compare favorably to CPS averages in Reading and Math, clearly indicating that CPS both Arts and non-Arts Magnet school cluster programs are consistently outperforming non-cluster CPS schools significantly, especially in Reading test scores.

**Section 2B Summary, Emerging Themes:** All Magnet Cluster Schools in the PAIR project significantly exceeded the CPS district percentages of ‘students who meet or exceed grade level benchmarks’ for ISAT Reading and Math scores. *In addition, the control-treatment school comparisons indicate that PAIR treatment students outpaced the control students most significantly by the third year of PAIR project suggesting that considerable elements of teacher professional development that support CAPE arts integrated practices are required before substantial positive student learning effects can occur. Results from PAIR Follow-up treatment classrooms indicate positive comparisons with non-PAIR classrooms after only two years, thus providing evidence that the PAIR methods are replicable and its effects are accelerating the second time around.*

The next set of data displays will represent academic performance data more precisely and with increased statistical power by using ISAT scaled scores to detect differences in student academic performance.

\* \* \*

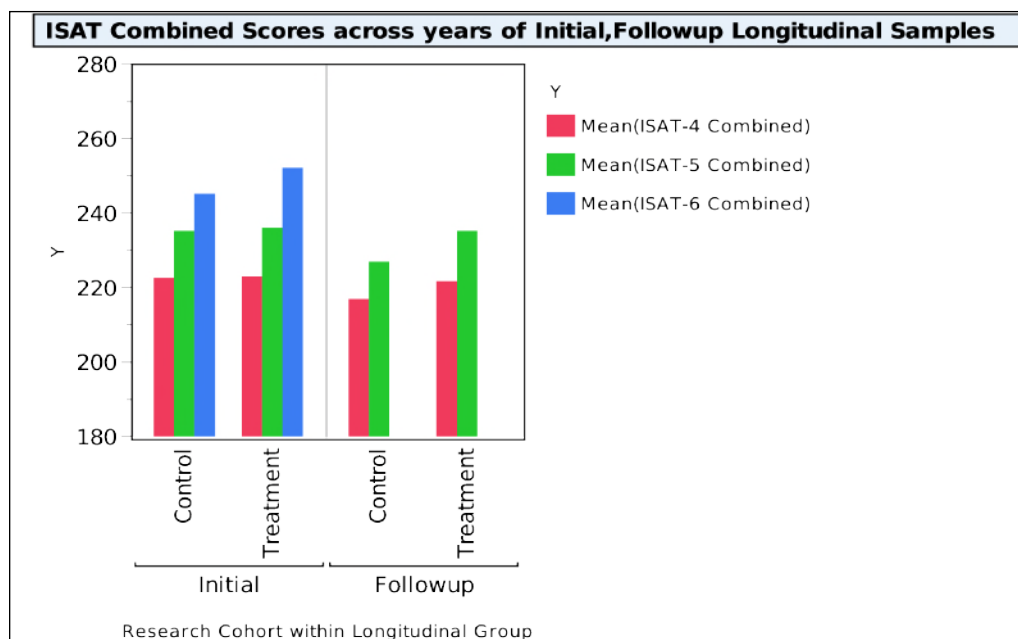
## **2C. Control-Treatment School Comparisons of PAIR Grade Level ISAT Mean Scores**

**2C Inquiry Question:** To what extent did ISAT standardized academic test score results distinguish PAIR Treatment schools from PAIR Control schools?



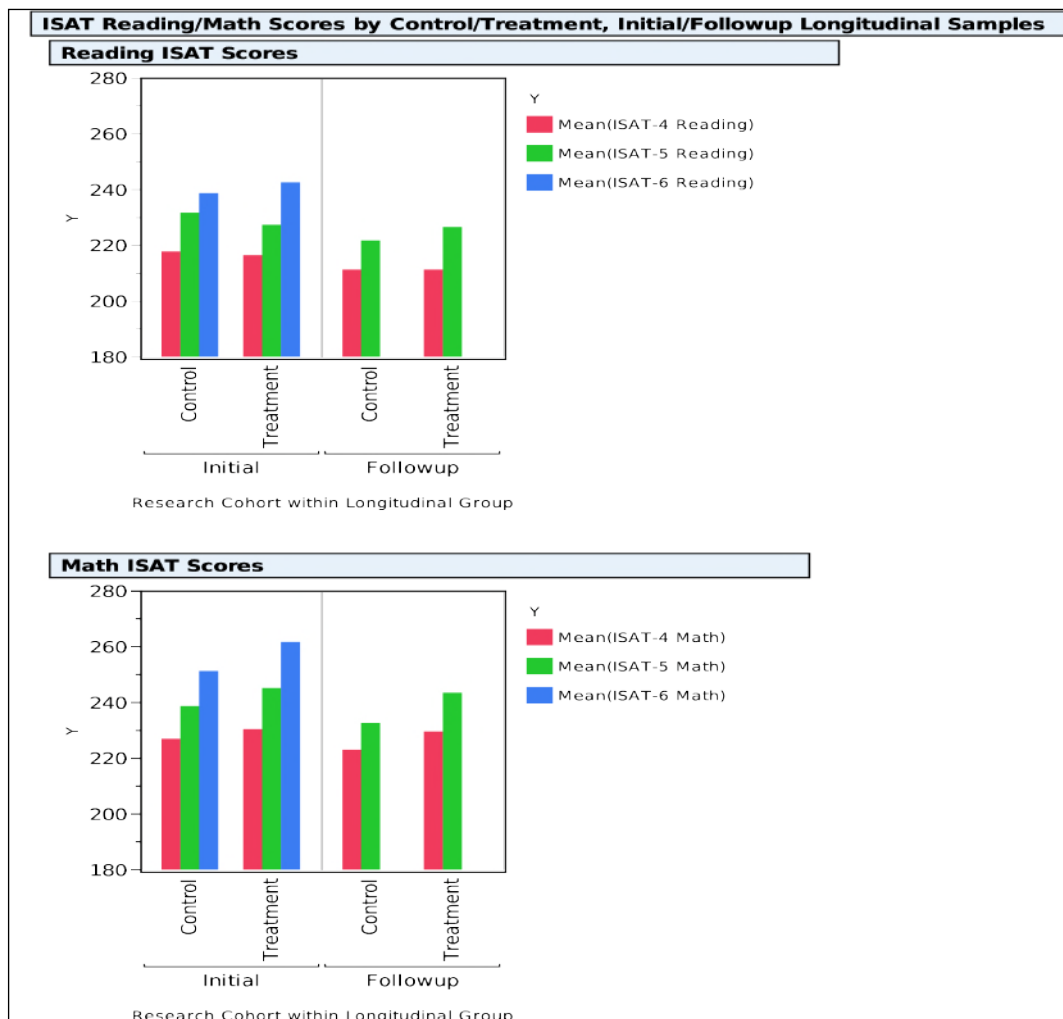
**2C Figure 1 Data Display Indications:** The figure below [2C Figure 1] shows that student ISAT combined academic scores in the Initial Longitudinal Treatment School cohort increasingly outpaced its Control School cohort at every grade level (2008-10), yet only during the final year of the project (Grade 6) did ISAT Control-Treatment school differences finally become statistically significant ( $p < .01$ ). However, both Follow-up Longitudinal Cohorts comparisons reveal immediate, highly significant differences favoring the Treatment school cohorts (grade 4 ( $p < .0004$ ;) and grade 5 ( $p < .0001$ ), suggesting strongly that the impact of the PAIR program increased during the second and third year implementation phases of the project.

**2C Figure 1: Control-Treatment ISAT Grade Level Comparisons of ISAT Combined (Averaged Reading and Math) Mean Scores, PAIR Initial and Follow-up Longitudinal Cohorts**



**2C Figure 2 Data Display Indications:** The bar graph chart below indicates that ISAT Reading scores are not significantly outpacing the control group in the Initial Longitudinal Cohort. Nonetheless, ISAT Treatment School Reading scores are significantly outpacing the follow-up grade levels in both grade 4 ( $p < .04$ ) and 5 ( $p < .000$ ). In Math, the pattern of control-treatment school differences is similar to Reading, yet more pronounced. In the Initial Treatment cohort significant differences are obtained in Grade 5 ( $p < .04$ ) and Grade 6 ( $p < .0002$ ) and in Treatment school follow-up student cohorts the statistical significance immediately obtains in grade 4 ( $p < .0001$ ) and sustained in grade 5 ( $p < .0001$ ).

**2C Figure 2: Control-Treatment Focus School (Arts vs. Academic) Comparisons of ISAT Grade Level Reading and Math Mean Scores, PAIR Initial and Follow-up Longitudinal Cohorts**



**2C Summary, Emerging Themes:** Control-treatment cohort comparisons of combined and disaggregated Reading and Math ISAT standardized test scores provided *statistically significant* evidence of PAIR’s impact on student learning outcomes. *The PAIR program impact, as measured by academic achievement test performance outcomes, became evident only after positive control-treatment comparisons were established in the Initial Longitudinal Student cohort by the third year of the project. The follow-up cohort comparisons demonstrated more immediate and more highly significant PAIR Treatment School student learning outcomes during the second year of the program.*

\* \* \*

## **2D: Control-Treatment Focus School (Arts vs. Academic) Comparisons of ISAT Mean Scores**

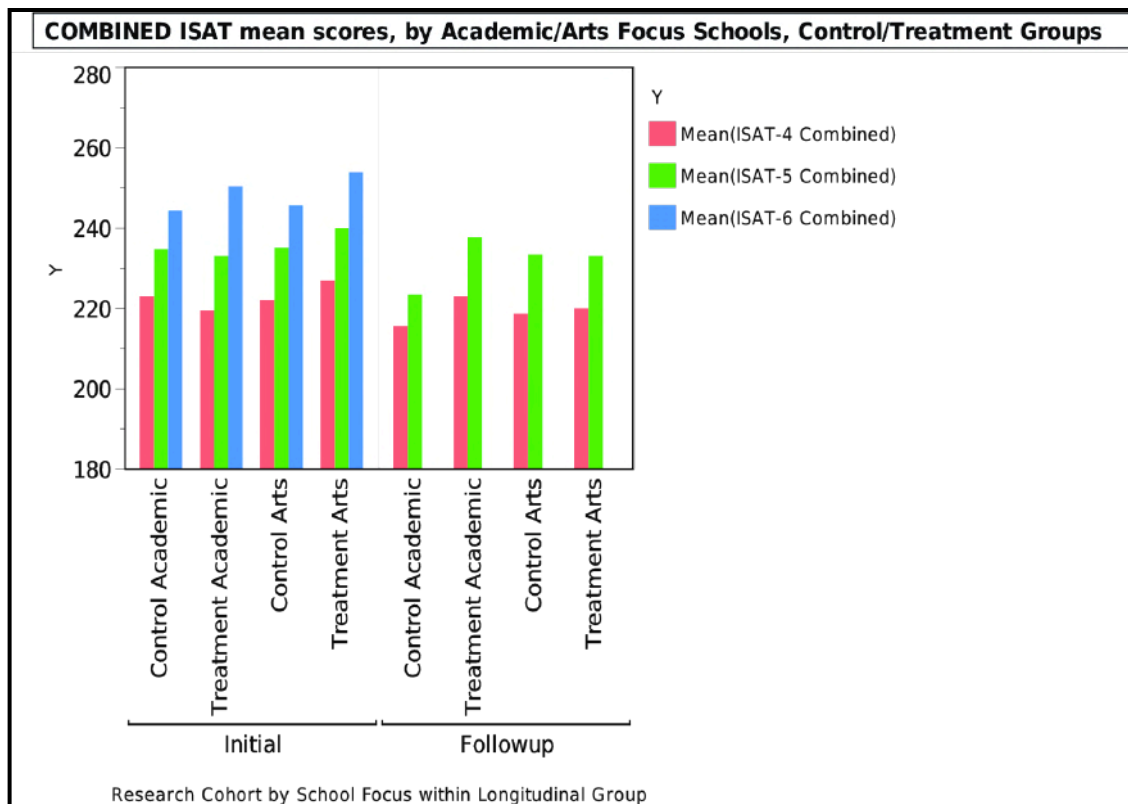
In the PAIR project, all schools were matched according to their primary focus on arts in contrast to non-arts learning. Table 2A-1 above describes how the PAIR Treatment and Control schools were evenly divided according to their designation and resources as Arts Learning Magnet Cluster Schools and various categories of academic learning such as Writing (English Language Arts), Math, or World Language (foreign language and cultural studies) Magnet Cluster Schools.

**2D Inquiry Question:** To what extent did the primary focus on arts versus non-arts learning predict differences in ISAT student learning outcomes?

**2D Figure 1 Data Display Indications:** The bar graph below [2D Figure 1] displays differences in grade level ISAT Combined academic mean scores according to School Focus and differentiated by Initial and Longitudinal student cohorts. The order of comparison progresses from Academic Focus control and treatment school comparisons to Arts control and treatment school comparisons (left to right). Results displayed here suggest that, *by the third year of the project, both Arts and Academic Treatment Focus Schools have higher levels of academic scores than do the Control Focus school, suggesting that PAIR program succeeds equally well with either type of school focus. This same pattern generally obtains in the Follow-up longitudinal cohorts, with far more dramatic results developing in the control-treatment Academic Focus schools comparisons than in the control-treatment comparisons among the Arts Focus Schools.*

(continued on next page)

**2D Figure 1: Control-Treatment PAIR Focus School (Arts vs. Academic)**  
**Comparisons of ISAT Mean Scores, PAIR Initial Longitudinal Cohorts, Grades 4-6.**



**2ID Summary, Emerging Themes:** In the Initial Longitudinal Student Cohort, the bar graph patterns show that the *Treatment Arts Focus Schools* maintain pre-eminence as the highest scoring PAIR Focus School throughout the three years of project development, while the *Treatment Academic Focus Schools* appear to be catching up by the final year of the project (from the lowest test scores in year 1 to the second highest by year 3). *These results indicate strongly that the PAIR Treatment Arts Focus School “arts plus arts integration programs” have a more profound effect on academic achievement than do the conventional arts learning programs in the Control Arts magnet schools.*

*The data here also show that it took three years for the PAIR Treatment Academic Focus School students in the Initial data sample to outperform the more conventional Control Academic Focus Schools. However, the Treatment Academic Focus School kids gained the advantage over the control schools immediately in the Follow-up student cohorts, most likely as a result of benefitting from the second and third year of classroom teacher experience with the program.*

Most striking was the pattern of increasingly deflated ISAT scores in the Control Academic Focus Schools in comparison with all other schools. After three years in the Initial cohort, the Control Academic schools went from being rated second highest to lowest scoring schools. *By the time PAIR was being replicated by classroom teachers in the Follow-up Cohorts, the Control Academic Focus Schools perpetually scored lower than all other school cohorts in the study.* This study clearly shows that CPS magnet schools defined by the adherence to academic focus are less likely to rely on arts learning resources and staff training devoted to arts integrated learning and, as a result, *Academic Focus Schools increasingly lagged behind the academic performance of schools that prioritize arts and arts integration teaching and learning programs that offer a more wide-ranging approach to inter-disciplinary teaching and learning practices.*

\* \* \*

## **2E: Control-Treatment PAIR School Achievement Gap Comparisons of ISAT Mean Scores According to Pre-Designated High, Average, and Low (HAL) Student Achievement Cohorts, Grades 3-6**

In the PAIR project, the students were randomly selected in equal numbers from pools of individuals categorized as High, Average, and Low (HAL) according to measures of academic performance available to each grade level in each school. Typically ISAT grade 3 test scores were used to designate who the H, A, or L students were before the PAIR program began. By having these HAL designations in equal numbers from each classroom in the longitudinal samples, we are able to trace the impact of PAIR on three different learner populations throughout each phase of PAIR project implementation.

**2E Inquiry Questions:** To what extent did the PAIR program benefit students previously designated as high, average and low academic achieving students prior to PAIR project implementation? Were there any control-treatment differences with regard to the learning achievement gaps between high, average, and low performing learners during the three-year development and implementation of the PAIR program? Is there an overarching difference in patterns of equity and excellence that were obtained in control-treatment school comparisons?

**2E Figure 1 Data Display Indications:** The bar charts below display ISAT Combined, Reading and Math mean scores according to HAL categories only in the Initial PAIR Longitudinal Cohort Grades 3 (baseline) and grades 4-6 implementation years of the project. The red bars represent the profile of mean scores that defined the HAL ratings; that is, the initial achievement gap that was used to categorize the students. The statistical trend in the control school data suggests that the achievement gap closes a bit between the high (H) and average (A) learners over time.

In contrast, the PAIR Treatment school profile reveals that (a) the achievement gap between PAIR Treatment School average (A) and low (L) student closes significantly in the early years of the project, and later on that (b) the overall achievement scores in Treatment scores become significantly higher than Control schools in the final year of the project and (c) the Treatment School Low students are significantly outperforming the Control group students in both Reading and Math by the final year of PAIR program development. Thus, *patterns that emerged consistently from data reports throughout various strands of the PAIR data analyses [2E Figure 1 below] suggests that closing the learning gap for students at risk for academic achievement leads later on to significantly higher levels of achievement for both previously High and Low ranked learners.*

(continued on next page)

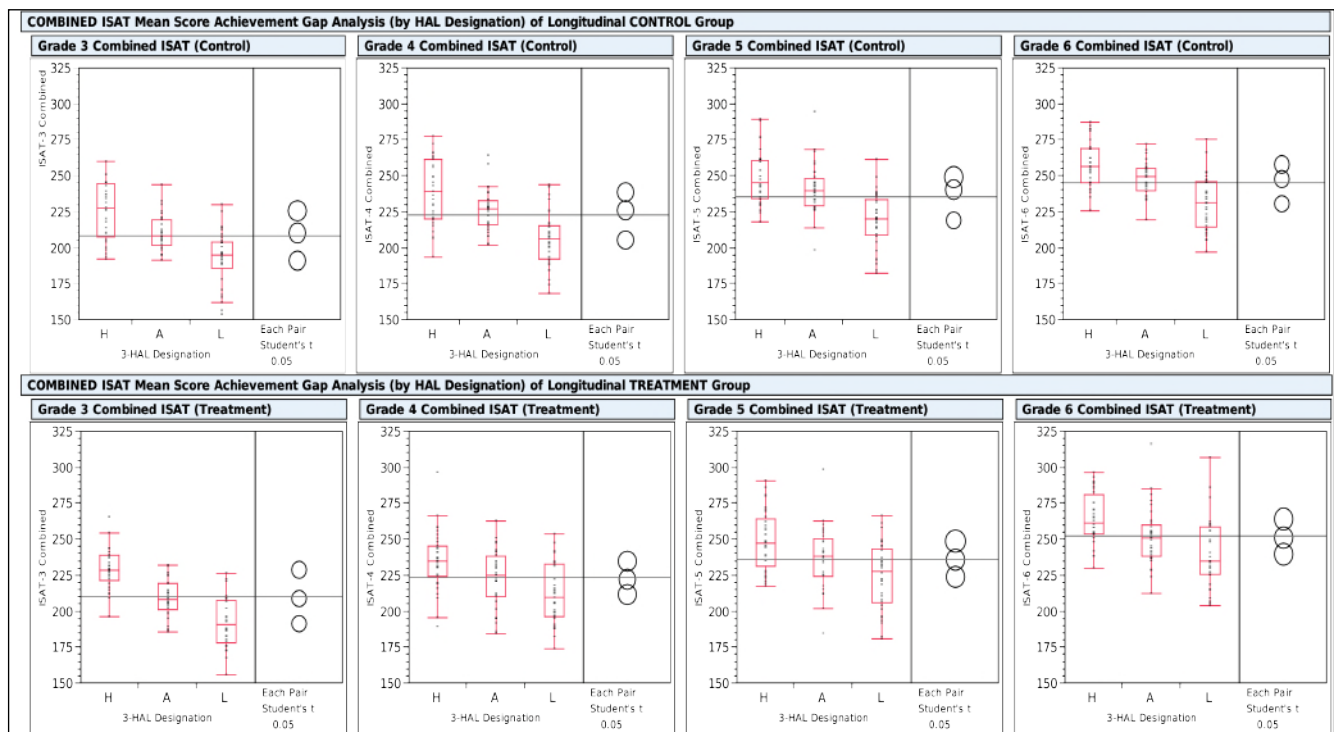
**2E Figure 1: Control-Treatment PAIR Schools Achievement Gap Bar Graph Display of HAL ISAT Combined, Reading, and Math Mean Scores, Grades 3-6 (Initial Longitudinal Cohort)**



The following charts [2E Figures 2-4] represent the control-treatment HAL learner gap analysis in more detail. The box plots in this chart profile mean score and range of student achievement changes with each year of the project. The circles to the right of each boxplot chart indicate statistically significant differences among the HAL student cohort learning profiles. Completely separated mean score parameters indicates a statistical determination that there are statistically significant achievement gaps between the learner categories. When the circles overlap, there is now longer a significant difference among the learning categories indicating that learning gap has been closed.

**2E Figure 2 Data Display Indications:** The circles at the right of each boxplot express the pattern of statistical significance of the achievement gaps among the HAL learners over time. The Control School pattern clearly indicates that the Low (L) learners remain significantly behind the High-Average (H-A) Learners throughout the four years of the project. In clear contract, the Treatment Schools pattern (a) begins with all three learning groups clearly differentiated academically, yet (b) the three groups are not statistically different for the remainder of the project as (c) the overall academic scores begin to favor students in the PAIR program.

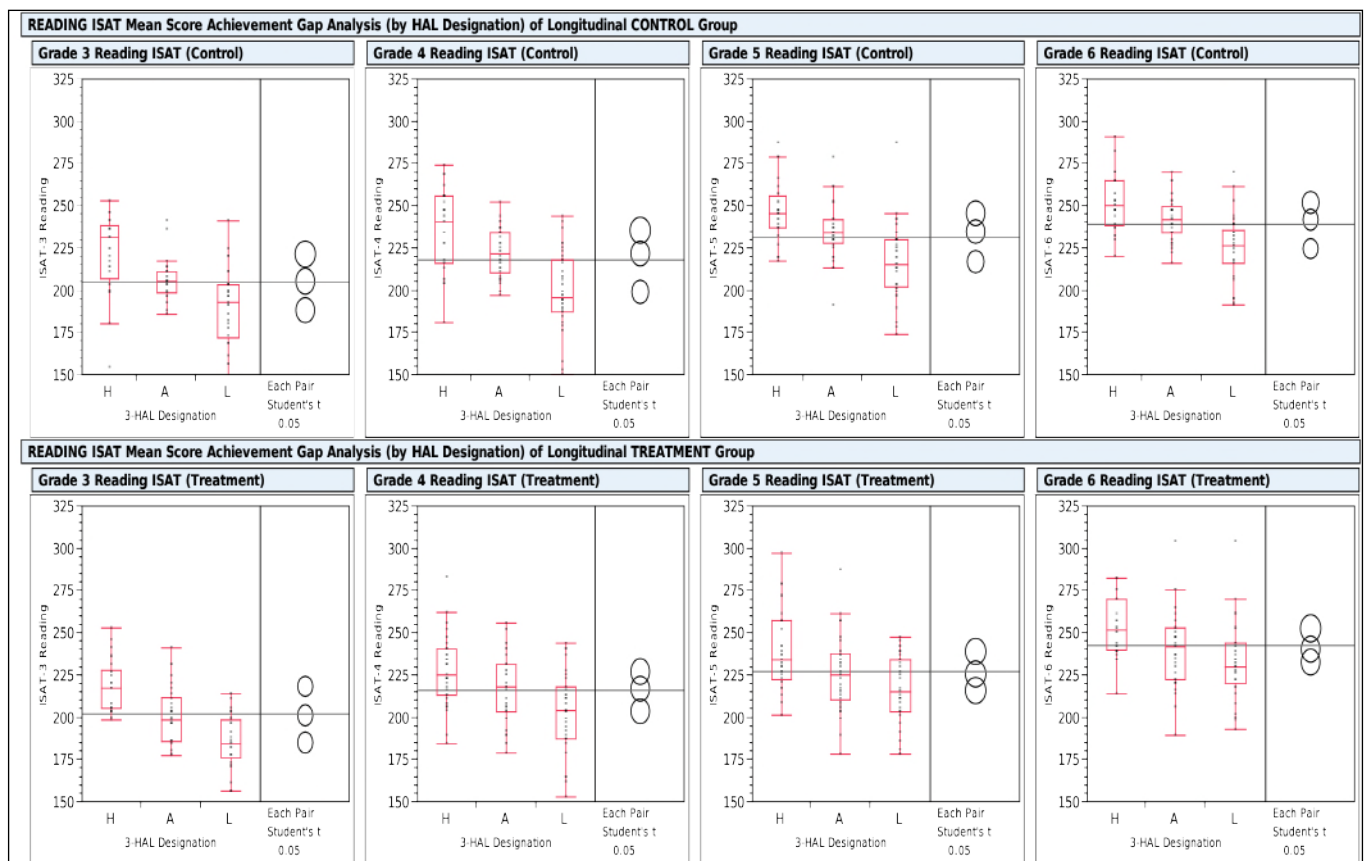
**2E Figure 2: Control-Treatment PAIR Schools Achievement Gap Box Plot Analysis of HAL ISAT Combined Academic Scores, Grades 3-6**





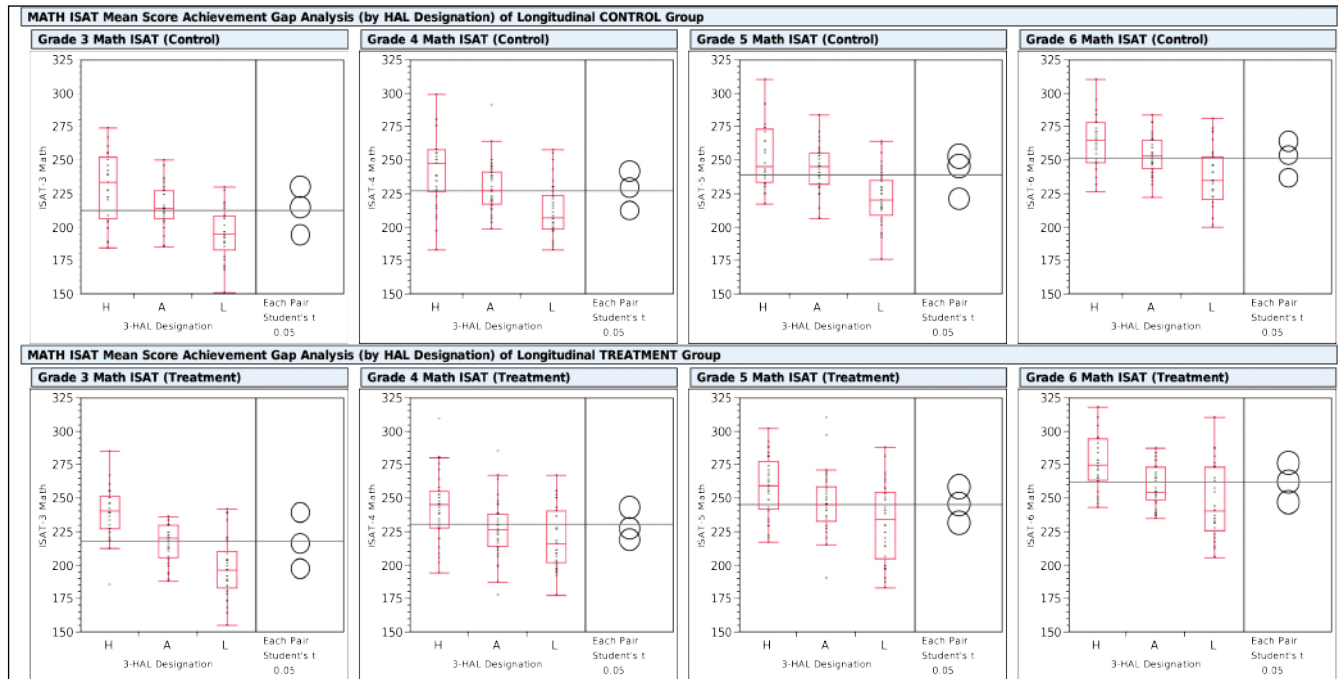
**Figure 2E Figure 3: Data Display Indications:** The following two charts display the HAL achievement gap analysis broken down by Reading and Math ISAT scores. The PAIR treatment school phenomenon of ‘closing the achievement gap for Low learners precedes overall superior academic achievement’ occurs in Math and especially in Reading. Note also that the achievement gap between Low learners and High-Average student cohorts appear never to reach the level of non-significance, i.e., the statistical evidence for closing the achievement gap among the three HAL student cohorts.

**2E Figure 3: Control-Treatment PAIR Schools Achievement Gap Box Plot Analysis of HAL ISAT Reading Scores, Grades 3-6**



(2E Figure 4 on next page)

**2E Figure 4: Analysis of Control-Treatment PAIR Schools Achievement Gap Box Plot According to HAL ISAT Math Scores, Grades 3-6**



**2E Summary, Emerging Themes:** Achievement gap analysis is a term used here to describe to the extent to which students previously classified as high [H], average [A] or low [L] academic achievement students in the third grade remain fixed in these categories as they progress through grades 4-6.

If there is little change in the statistically significant differences in mean score averages among Treatment HAL student cohorts, then the achievement gaps remain in place during the course of the PAIR program development. If the mean scores become more highly differentiated, the gap PAIR program will be associated with widening the learning gap between the previously designated low, average and higher learners. However, if the PAIR program results in weakening the distinctions among the HAL cohorts in Control-Treatment cohort comparisons, the PAIR program then will appear to have contributed to closing the learning gap among learners. Ideally, if PAIR Treatment schools were to close this achievement gap while simultaneously outperforming the Control Schools, then PAIR program results would suggest that changing the dynamics of widely separated, fixed student learning groups is a contributing factor to broad-based positive change in academic performance and a school culture of equitable teaching and learning practices.

The data presented so far in this report suggest that the pattern of HAL student cohort performance on ISAT tests vary considerably in control-treatment comparisons. Strikingly similar to the ideal scenario described above, the bar chart displays indicate that Treatment Schools a) consistently narrowed the learning gap for the designated Low achieving students in all areas of academic performance throughout all three years of the PAIR project and, b) by the final year of the PAIR project, the Treatment Schools were outperforming Control Schools in Combined and Math Academic Scores, while keeping pace with Reading Scores. *Most importantly, to whatever extent the ISAT Treatment School scores outpaced the Control Schools, the Treatment School PAIR Treatment Low achievement student cohorts always significantly outperformed their counterpart Control School Low cohort students in every area of academic achievement.*

*The boxplot analyses provided statistically significant evidence that the boundaries among the HAL classifications are less rigid in PAIR Treatment schools than in the PAIR control schools. The pattern and shape of these data represent unmistakable evidence of a pattern of “equity leading to excellence” in the PAIR treatment schools.*

The analysis of HAL cohort data provides an important window onto the nature and problems of achievement gaps among various sorts of students in public education. In this study it appears that to some degree schools that did not employ arts integration teaching and learning practices in their schools for the most part essentially reinforce predisposed assessments of students as high, medium or low achievers. *In PAIR Treatment schools statistical results support the hypothesis that arts integration programs can reduce the achievement gap for low-achieving students at risk for falling further behind the pre-classified high and/or average students – and that leveling the playing field for all learners can lead to yet higher levels of whole school academic performance.*

Further analyses below will look into this hypothesis in more detail through further external student learning comparisons based on School Focus (primarily Arts or Non-Arts) and School Cluster designations (Writing (ELA), Math, and World Language (& Cultures).

\* \* \*

## **2F: Control-Treatment PAIR Focus School (Arts vs. Academic) Comparisons of HAL ISAT Mean Scores and Achievement Gap Profiles, Grades 3-6**

As previously discussed, PAIR schools were selected in equal numbers from pools of CPS Magnet Cluster Schools categorized as Arts Learning Focus Schools that are also assigned an Academic Focus in Writing (ELA), Math, or World Language (WL) Cluster Schools. Thus student learning outcomes in the PAIR project can be grouped into the following four categories of schools: Control Academic, Treatment Academic, Control Arts, and Treatment Arts schools [see Table IA above].

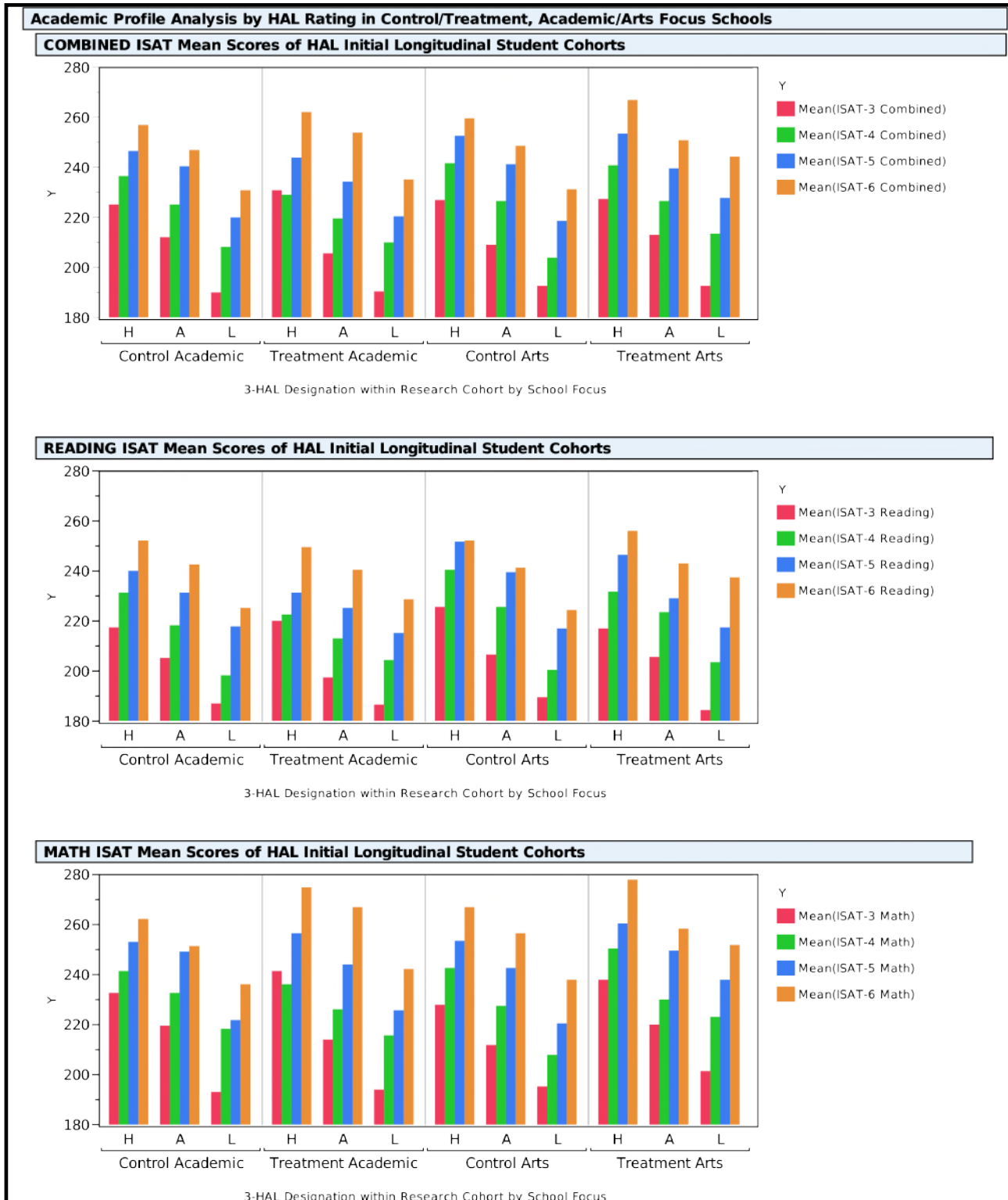
**2F Inquiry Questions:** To what extent does the category of School Focus (primarily arts v. academic) affect standardized test outcomes? To what extent does the category of School Focus affect any control-treatment differences with regard to the learning gaps among high, average, and low performing learners during the three-year development and implementation of the PAIR program?

**2F Figure I Data Display Indications:** The bar chart display below demonstrates differences in ISAT mean scores among the four types of PAIR Focus Schools. Reading from left to right, the red bars (project planning year data) are extremely similar in scope in all school cohorts by definition, because the HAL student cohorts were selected and matched according to relative High, Average, and Low levels of achievement according to ISAT test results in the 3<sup>rd</sup> grade.

In the first two years of project implementation, the data show that both control and treatment ARTS FOCUS schools scored higher in combined academic test scores than control and treatment Academic Schools, suggesting at that time that Arts Focus, and not the PAIR program was the more powerful predictor of academic achievement results.

*However, by the final year of the project we see that both treatment Arts and treatment Academic PAIR schools posted the highest Combined ISAT scores, with the Treatment Arts Schools showing the largest gains from year 2 to year 3. In the final analysis it is the Treatment Arts FOCUS schools that not only have the highest test scores, but also demonstrate the clearest evidence for closing the achievement gap with previously designated below average learners, especially in Math [2F Figure 1].*

**2F Figure 1: PAIR Focus School Control-Treatment Achievement Gap Bar Graph Display of ISAT Combined, Reading, and Math Scores by HAL Cohorts, Grades 3-6**



**2F Table 1 Data Display Indications:** The patterns of significant differences associated with the data results displayed in Figure 2E-1 also obtain in the following three tables.

In the table below, an interpretive rubric is provided to provide a lens for measuring change in the grade level HAL ISAT data results over time. The placement of the slash marks (/) indicate highly distinct, statistically significant boundaries exist at various divisions among the HAL learner cohorts at all levels of the project. The degree of separation in the HAL cohort ISAT outcomes ranges from ‘most differentiated’ (i.e., separated according to significant differences between the HAL cohorts) to ‘least differentiated’ performance’ (in some cases, no significant differences whatsoever among the three HAL levels).

**2F Table 1: Rubric for Categorizing Statistically Significant Levels of Achievement Gap Separation among the HAL Student Cohorts.**

Most Differentiated -----Least Differentiated			
Level 1: H/A/L	Level 2a: HA/L or Level 2b. H/AL	Level 3: HA/AL	Level 4: HAL

The table below [2F Table 2] represents the various pattern of HAL ‘achievement gap analysis’ of HAL ISAT Combined scores in both the Control and Treatment Schools. This table reveals that the statistically significant achievement gaps in Control Schools never change among the HAL group cohorts and that the achievement gap is always most severe between low (L) learner cohorts and the rest of the students.

In contrast, the pattern of decreasing differentiation among the HAL cohorts obtains much more strongly in the Treatment Schools. In both Arts and Academic Focus Schools, the highly differentiated academically rated populations (High, Average, Low Learners) obtained at the beginning of the project become far less separated as the project implementation proceeded. Most significantly, the initially Low learning students are no longer performing at a statistically significantly different level from the previously designated Average Learners.

**2F Table 2: Levels of Statistically Significant Achievement Gap in HAL ISAT Combined Test Scores by Control-Treatment School Focus Designation, Grades 3-6**

	CONTROL <i>ACADEMIC FOCUS</i> CPS Magnet Schools	TREATMENT <i>ACADEMIC FOCUS</i> (Plus Arts Integration) CPS Magnet Schools	CONTROL <i>ARTS FOCUS</i> CPS Magnet Schools	TREATMENT <i>ARTS FOCUS</i> (Plus Arts Integration) CPS Magnet Schools
Grade 3 (baseline)	HA/L	H/A/L	H/A/L	H/A/L
Grade 4 (PAIR yr1)	HA/L	HA/AL	H/A/L	H/AL
Grade 5 (PAIR yr2)	HA/L	HA/AL	HA/L	HA/AL
Grade 6 (PAIR yr3)	HA/L	HA/L	HA/L	H/AL

The separated Reading and Math ISAT results in the next two tables [2F Tables 3-4] indicate that this same pattern of reduction of the learning gap far more significantly in PAIR Treatment School cohorts compared to the Control Schools in both disciplines.

**2F: Table 3: Levels of Statistically Significant Achievement Gap Differentiation in HAL ISAT Reading Test Scores by Control-Treatment Focus School Designation, Grades 3-6**

	CONTROL <i>ACADEMIC FOCUS</i> CPS Magnet Schools	TREATMENT <i>ACADEMIC FOCUS</i> (Plus Arts Integration) CPS Magnet Schools	CONTROL <i>ARTS FOCUS</i> CPS Magnet Schools	TREATMENT <i>ARTS FOCUS</i> (Plus Arts Integration) CPS Magnet Schools
Grade 3 (baseline)	HA/L	H/AL	H/A/L	H/A/L
Grade 4 (PAIR yr1)	HA/L	HA/AL	H/A/L	HA/L
Grade 5 (PAIR yr2)	HA/L	HA/AL	HA/L	H/AL
Grade 6 (PAIR yr3)	HA/L	HA/L	HA/L	HA/AL

**2F: Table 4: Levels of Statistically Significant Achievement Gap Differentiation in HAL ISAT Math Test Scores by Control-Treatment School FOCUS Designation, Grades 3-6**

	CONTROL <i>ACADEMIC FOCUS</i> CPS Magnet Schools	TREATMENT <i>ACADEMIC FOCUS</i> (Plus Arts Integration) CPS Magnet Schools	CONTROL <i>ARTS FOCUS</i> CPS Magnet Schools	TREATMENT <i>ARTS FOCUS</i> (Plus Arts Integration) CPS Magnet Schools
Grade 3 (baseline)	HA/L	H/A/L	H/A/L	H/A/L
Grade 4 (PAIR yr1)	HA/AL	H/AL	H/A/L	HA/AL
Grade 5 (PAIR yr2)	HA/L	HA/AL	HA/L	HA/AL
Grade 6 (PAIR yr3)	HA/L	HA/AL	HA/L	H/AL

**2F Summary, Emerging Themes:** The bar chart displays and tables that trace patterns of significance distinctions among the HAL cohorts presented here show that, over time, *the PAIR Treatment Schools generally outperform the Control Schools regardless of their designation as an Arts or Academic (Non-Arts) FOCUS School. This finding suggests that PAIR arts integration treatment improves school performance for both arts and academic focused schools with equal effect.*

*In addition, the achievement gap analysis establishes that the Arts Treatment Schools – those schools that focus both on arts and arts integration teaching and learning – not only outperform all other schools as previously reported, but also demonstrate the most compelling school profile for reducing the learning gap for low achieving students. These findings suggest that PAIR arts integration methods and practices best demonstrate how raising test scores and closing the gap for the lowest level achievers is also a potent strategy for improving school culture and academic improvement simultaneously.*

The next section presents case study differences in ISAT and HAL cohort data according to the shared academic focus of the PAIR school collaborations.

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## **2G: Control-Treatment PAIR MAGNET CLUSTER SCHOOL (ELA, Math, World Language) Comparisons of HAL ISAT Mean Scores and Achievement Gap Profiles, Grades 3-6**

As previously discussed, PAIR schools were selected in equal numbers from pools of CPS Magnet Cluster Schools assigned an Academic Focus in Writing (ELA), Math, or World Language & Cultures (WL) Schools [Table 1A above]. Throughout the PAIR project Arts and non-Arts teachers were assigned to collaborate with two CAPE teaching artists to create and implement arts integration units designed to reinforce on essential concepts that would optimize learning across two arts disciplines. Treatment Writing (ELA) Cluster schools worked with CAPE music and drama teaching artists; Treatment Math Cluster school teachers worked with CAPE dance and visual arts teaching artists; Treatment World Language s (WL) Schools worked with CAPE music and visual arts teaching artists [Table 1A above]. This essential structural feature of the PAIR treatment schools challenged the



CAPE teaching artists to co-create and implement units throughout the three years of implementation that addressed the essential focus and needs of each Cluster School type. Thus the ‘pairing’ of arts integration specialists with classroom teachers constituted, along with the supporting professional development sessions and requirements, represents the element of the PAIR program that distinguished the Treatment from the Control Cluster Schools.

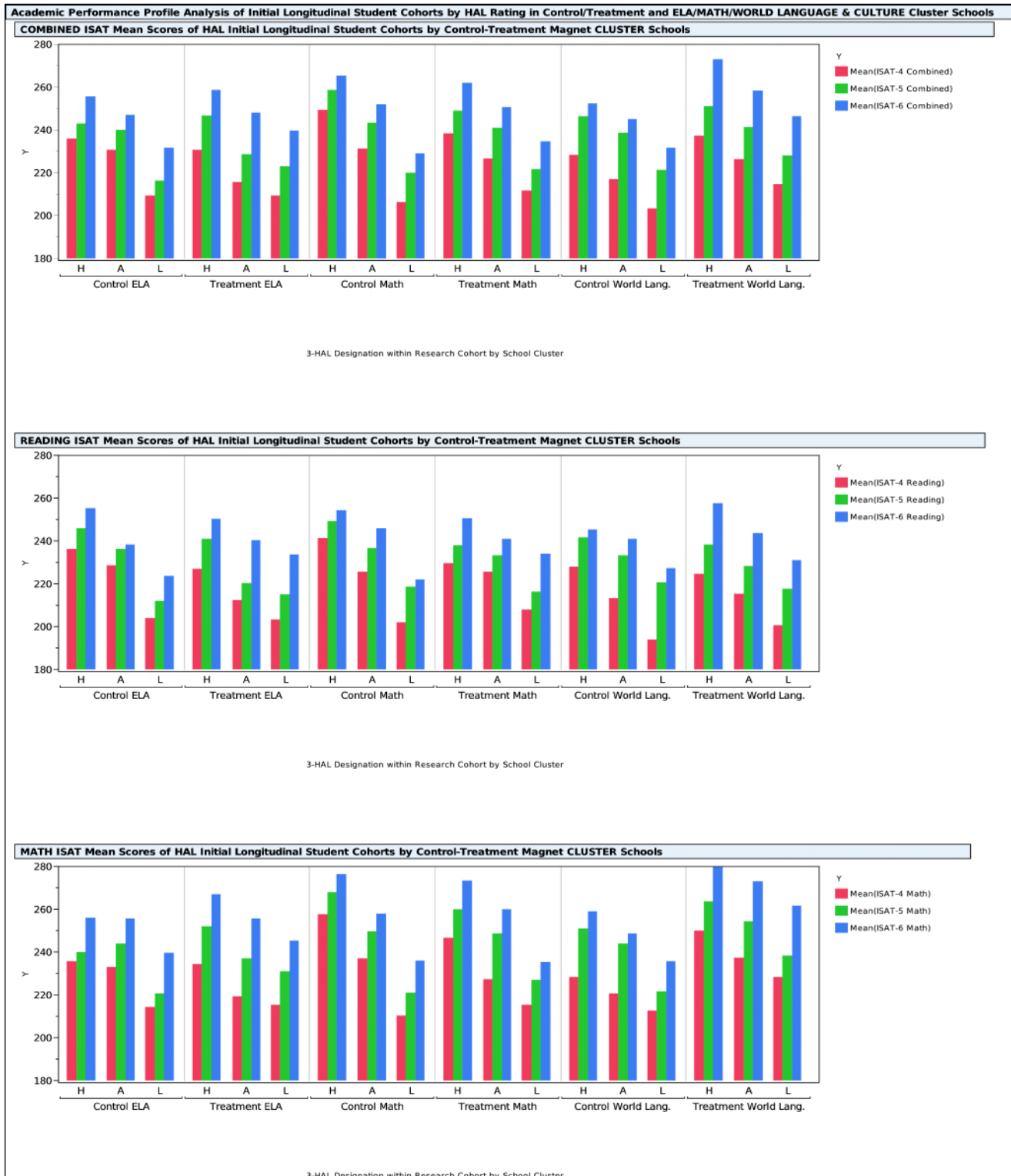
**2G Inquiry Questions:** To what extent does the category of Cluster School Academic focus (ELA vs. Math vs. World Languages) affect ISAT standardized test scores and the HAL student cohort learning outcomes? To what extent does the category of School Cluster affect any control-treatment differences with regard to the learning gaps among high, average, and low performing learners during the three-year development and implementation of the PAIR program?

**2G Figure 1 Data Display Indications:** *Statistical trends in the ISAT Combined Scores indicate that all the PAIR Treatment Cluster Schools, regardless of any Academic focus classification, are more likely than Control Schools to generally outperform or to close the achievement gap for the most at risk learners by the third year of the project. It is also clear that the one particular set of schools, the World Language Cluster Schools, consistently significantly outperform all other Cluster School types and manage to narrow the gap between the high, average and low performing students.*

Although comparisons in Reading ISAT scores reveal that there may be a few cases where reading achievement in the highest HAL cohorts may be superior in the Control ELA and Math Cluster Schools compared to the Treatment schools, the Low Achiever cohort gap is still significantly less present in all the Treatment schools. *And in no cases do the Control School Low performing students outperform the low performing students in Treatment schools.* Once again there is no doubt that the Treatment World Language schools are outperforming their control group counterparts in all three HAL cohorts, all three years of project implementation.

Although the Math ISAT scores for the Math Cluster schools are virtually the same in both the Control and Treatment Schools, the ELA gained an edge over their comparison schools in the last two years of the project. WL Treatment schools outpaced their Control Schools completely at every phase of the project in terms of ISAT mean scores while, in this case, both Control and Treatment schools managed to close the achievement gap significantly.

**2G Figure 1: Control-Treatment PAIR Cluster School Achievement Gap Analysis of ISAT  
Combined, Reading, and Math Scores by HAL Cohorts, Grades 4-6**



Section 2G Tables 1-3 below display the various pattern of HAL ‘achievement gap analysis’ in HAL ISAT Combined, Reading, and Math scores in both the Control and Treatment Schools. These tables reveal that, *regardless of Cluster School Type, Control Schools are never able to demonstrate change among the HAL group cohorts and that the gap is always most severe between low (L) learner cohorts and the rest of the students.*

In contrast, the Treatment Schools demonstrate that the initially designated Low learning students are no longer performing at a statistically significantly different level from the previously designated Average Learners in the first year of the PAIR project. By year 3 of the project most Treatment Cluster schools have virtually removed the gap between previously designated High, Average, and Low Achievers.

**2G Table 1: Control-Treatment PAIR Cluster School Levels of Statistically Significant Achievement Gap Differentiation in HAL ISAT Combined Test Scores, Grades 3-6**

	CONTROL <i>Writing-ELA</i> Cluster Schools	TREATMENT <i>Writing-ELA</i> Cluster Schools	CONTROL <i>Math</i> Cluster Schools	TREATMEN <i>T Math</i> Cluster Schools	CONTROL <i>WL</i> Cluster Schools	TREATMENT <i>WL</i> Cluster Schools
Grade 3 (baseline)	H/A/L	H/AL	H/A/L	H/A/L	HA/AL	H/A/L
Grade 4 (PAIR yr1)	HA/L	HA/AL	H/A/L	H/AL	HA/L	HA/AL
Grade 5 (PAIR yr2)	HA/L	HA/AL	HA/L	HA/L	HA/L	HA/AL
Grade 6 (PAIR yr3)	HA/L	HAL	H/A/L	HA/AL	HA/AL	HA/AL

**2G Table 2: Levels of Achievement Gap Differentiation in HAL ISAT Reading Test Scores by Control-Treatment School Cluster Designation and by Grade**

	CONTROL <i>Writing-ELA</i> Cluster Schools	TREATMENT <i>Writing-ELA</i> Cluster Schools	CONTROL <i>Math</i> Cluster Schools	TREATMEN <i>T Math</i> Cluster Schools	CONTROL <i>WL</i> Cluster Schools	TREATMENT <i>WL</i> Cluster Schools
Grade 3 (baseline)	H/A/L	H/A/L	HA/L	HA/L	HA/AL	H/A/L
Grade 4 (PAIR yr1)	HA/L	HA/AL	HA/L	HA/AL	HA/L	HA/AL
Grade 5 (PAIR yr2)	HA/L	HA/AL	HA/AL	HA/AL	HA/AL	HA/AL
Grade 6 (PAIR yr3)	H/A/L	HAL	HA/L	HAL	HA/AL	HA/AL

**2G Table 3: Levels of Achievement Gap Differentiation in HAL ISAT Math Test Scores  
by Control-Treatment School Cluster Designation and by Grade**

	CONTROL <i>Writing-ELA</i> Cluster Schools	TREATMENT <i>Writing-ELA</i> Cluster Schools	CONTROL <i>Math</i> Cluster Schools	TREATMEN T <i>Math</i> Cluster Schools	CONTROL <i>WL</i> Cluster Schools	TREATMENT <i>WL</i> Cluster Schools
Grade 3 (baseline)	H/A/L	H/AL	H/A/L	H/A/L	HA/AL	H/Ad/L
Grade 4 (PAIR yr1)	HA/L	HA/AL	H/A/L	H/A/L	HA/L	HA/AL
Grade 5 (PAIR yr2)	HA/L	HA/AL	HA/L	HA/L	HA/AL	HA/AL
Grade 6 (PAIR yr3)	HA/L	HAL	H/A/L	HA/AL	HAL	HA/AL

**2G Summary, Emerging Themes:** The PAIR Cluster School data analysis reaffirm that the PAIR Treatment Schools academically outperform and more consistently narrow the academic achievement gap for previous Low rated students in comparison with Control Schools regardless of their designation as an ELA-Writing, Math, or World Language Magnet School. In addition, it appears that the PAIR World Language Treatment Schools – those schools that focus on both arts and arts integration teaching strategies to address their particular academic focus on multiple languages and social studies - outperform all other cluster school types in standardized test scores thereby demonstrating the most compelling school profile for boosting academic achievement while reducing the learning gap for low achieving students.

A research question stated in Part 1 of this report – Do teachers who demonstrate high levels of committed participation in the PAIR project positively influence student achievement? – will be explored vigorously through further analyses of student arts integration learning assessments and the patterns of statistical connections that will offer evidence of causal links between teacher professional development variable and student outcomes in the third and final sections of this comprehensive report.

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